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Valvular Heart Disease

QUANTIFICATION OF DYNAMIC ANNULAR FORCES IN AN OVINE MODEL OF ISCHEMIC MITRAL REGURGITATION

ACC Moderated Poster Contributions
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Background: Forces acting on mitral annular devices in the setting of Ischemic Mitral Regurgitation (IMR) is currently unknown. Determining their peak magnitudes, time rates of change, and relationship with Left Ventricular Pressure (LVP) will aid in device development.

Methods: Novel force transducers were implanted in the mitral annulus of normal (N=6) and IMR sheep (N=6) 8 weeks after a posterior infraction of the left ventricle that produced progressive severe chronic IMR. Septal-lateral (SL) and transverse forces were continuously measured for cardiac cycles reaching a peak Left Ventricular Pressure (LVP) of 90, 125, 150, 175, and 200 mmHg.

Results: At the time of measurement, IMR animals exhibited a mean mitral regurgitation grade of 1.86 ± 1.47. IMR animals exhibited a lower SL force at each level of peak LVP when compared to the normal animal group (p<.01). IMR animals additionally had a lower transverse force at a peak LVP of 125, 150, and 175 mmHg (p<.05). For a peak LVP of 90 mmHg, the rate at which SL forces increased during isovolumetric contraction (dF/dt) was lower for the IMR group (p<.05) but did not significantly differ between groups in the transverse direction.

Conclusions: Forces resulting from annular contraction were measured for the first time in an IMR animal model. Our findings demonstrate that SL forces increase with peak LVP and are lesser in magnitude within IMR animals. Directional differences in both peak force and rate have strong implications in the development of devices.